

Remarks:

Claims 1-34 and 50-52 are currently under examination in the Subject Application. Original claims 35-49 were withdrawn in response to the Examiner's previously-issued restriction requirement, and those withdrawn claims are cancelled in the present Response. Applicants also cancel claims 3, 9, 11, 21-31, and 50-52, and amend several of the remaining claims. As such, upon entry of the amendments in this Response, claims 1, 2, 4-8, 10, 12-20, and 32-34 will remain under examination in the Subject Application.

Initially, the undersigned and inventors Robin Forbes Jones and Larry Kay thank Examiner Roe and SPE King for meeting with us on November 21 to discuss the Office Action and possible additional amendments to the claims. The undersigned also thanks Examiner Roe for reviewing the proposed amended claims and the declaration of Edwin Snape faxed to the Examiner on November 22. In a November 24 voice-mail message to the undersigned, Examiner Roe indicated that there appears to be support in the Subject Application for the proposed amendments presented in the fax and suggested that the undersigned submit the amendments formally. Accordingly, Applicants submit those amendments and the Snape Declaration in the present Response, as further discussed below.

The attached amended claims include two independent claims, claims 1 and 32. Claim 1 is directed to an alloy "having favorable fatigue resistance" that comprises, among other things, "less than 30 ppm nitrogen", "less than 0.7 weight percent titanium", and "at least one of at least 0.05 weight percent aluminum, at least 5 ppm calcium, at least 5 ppm magnesium, and at least 5 ppm cerium". Claim 1 also recites that the alloy "includes generally spherical oxide inclusions and is substantially free of titanium nitride and mixed metal carbonitride inclusions". Each of claims 2, 4-8, 10, and 12-20 directly or ultimately depend from claim 1. Independent claim 32 is directed to an article of manufacture including the alloy of any of claims 1, 2, 4-8, 10, and 12-20. claims 33 and 34 depend from claim 32. Thus, if the alloy of attached amended claim 1

is both novel and unobvious, then it follows that each other claim pending in the Subject Application after entry of the attached amendments also is novel and unobvious.

The Office Action does not include rejections based on lack of novelty. Since claim 1 has been amended herein to include additional limitations, it necessarily follows that the subject matter of amended claim 1 remains novel. No prior art reference of record discloses an alloy as recited in claim 1 above.

The Office Action includes § 103(a) rejections based on the asserted combination of either (i) ASTM specification F 562-02 ("the ASTM Specification") and the Cockcroft et al. article entitled "Inclusions and the EB Refining of Superalloys" ("the Cockcroft article"); or (ii) the ASTM Specification, the Cockcroft article, and one of U.S. Patent No. 3,816,106 to Snape ("the Snape patent") and U.S. Patent No. 4,474,733 to Susukida et al. ("the Susukida patent"). As discussed in detail in the November 21 examiner interview, and as further discussed below, one having ordinary skill would not have combined or been motivated to combine the asserted teachings of the ASTM Specification with the asserted teachings of the Cockcroft article, the Snape patent, or the Susukida patent in the manners set forth in the Office Action.

1. The Cockcroft Article

With regard to the Cockcroft article, as discussed in the November 21 examiner interview, one of ordinary skill in metallurgy would not have been motivated to utilize the electron beam melting technique described in the Cockcroft article to melt the alloy (MP35N alloy) described in the ASTM Specification (entitled "Standard Specification for Wrought 35Cobalt-35Nickel-20Chromium-10Molybdenum Alloy for Surgical Implant Applications") as a means to reduce titanium nitride inclusions or for another reason. This is at least for the reason that it is well recognized that electron beam melting does not allow for any significant control of solidification of the molten alloy, resulting in a compositionally inhomogeneous ingot exhibiting a substantial degree of microsegregation-related melt defects such as, for example, "freckles", etc. Such melt defects would reduce the fatigue resistance of the alloy and negatively affect other

mechanical properties of the alloy. One of ordinary skill would have recognized that an MP35N alloy produced by electron beam melting would be unacceptable for the applications to which ASTM specification F 562-02 is directed. Thus, one of ordinary skill would not have considered utilizing electron beam melting to prepare the alloy of the ASTM Specification or, for that matter, the alloy recited in present claim 1. It is noted, for example, that embodiments described in Examples 1-3 in the Subject application were prepared by a combination of vacuum induction melting and vacuum arc remelting ("VIM-VAR") and not by electron beam melting.

In support of the foregoing arguments, Applicants attach the Declaration of Dr. Robin M. Forbes Jones. The Forbes Jones declaration also provides an actual example of the microsegregation-related melt defects that developed in a superalloy that was processed by electron beam melting.

Given that one of ordinary skill would not have and would not have been motivated to process the MP35N alloy described in the ASTM Specification by the electron beam melting process described in the Cockcroft article, the rejection of claim 1 should be withdrawn.

2. The Snape and Susukida Patents

With regard to the Snape and Susukida patents, the undersigned and Dr. Forbes Jones further discussed with the Examiner during the November 21 interview that the alloys described in those patents differ so substantially from the alloy of the ASTM Specification that one having ordinary skill would not have been motivated to look to the teachings of either of the patents for possible modifications to the alloy described in the ASTM specification. As noted during the interview, Applicants herewith attach the Declaration of Edwin Snape, Ph.D., in support of these arguments. Dr. Snape is the sole inventor named on the Snape patent, is not employed by or affiliated with the assignee of the Subject Application, and has at least the requisite level of skill relevant to opining on whether an ordinarily skilled individual would have been motivated to

combine the asserted teachings of the Snape or Susukida patents with the subject matter of the ASTM Specification.

As Dr. Snape states in the attached declaration, the alloy described in the Snape patent has a composition that differs substantially from MP35N alloy, which is the alloy composition set forth in the ASTM Specification. The alloy described in the Snape patent, for example, includes 22-40 wt. % chromium, 10-25 wt. % nickel, and at least 15 wt. % iron, and apparently lacks molybdenum. In contrast, the alloy of the ASTM Specification includes no more than 21.0 wt. % chromium, at least 33.0 wt. % nickel, no more than 1.0 wt. % iron, and at least 9.0 wt. % molybdenum. Dr. Snape attests that given these compositional differences and the fact that even relatively minor compositional differences can substantially alter how an alloy reacts to alloying additions, "one of ordinary skill in metallurgy would not have concluded that the aluminum or magnesium additions taught in the [Snape patent] would have the same affect on the MP35N alloy as described in the [Snape patent]." Dr. Snape further attests that "given the substantial compositional differences between the alloys, one of ordinary skill would not have looked to the [Snape] patent for teachings on how to modify the MP35N [alloy] to improve its properties."

With regard to the Susukida patent, Dr. Snape states that the alloy composition described in the patent substantially differs from the MP35N alloy. For example, as noted in the Snape Declaration, the alloy of the Susukida patent includes nickel, 0.001-0.15 wt. % carbon, 0.0005-0.05 wt. % calcium, 20.0-26.0 wt. % chromium, 4.7-9.4 wt. % cobalt, 5.0-16.0 wt. % molybdenum, 0.5-4.0 wt. % tungsten, and at least about 40 wt. % nickel. This contrasts with the MP35N alloy composition, which includes a maximum of 37.0 wt. % nickel and at least 29 wt. % cobalt. Dr. Snape attests that given the significant and substantial compositional differences between the alloys, and further given the affect of even small compositional differences between alloys, "one of ordinary skill would not have concluded that the calcium addition taught in the [Susukida] patent would have the same affect on the MP35N alloy as described in the [Susukida] patent." Dr. Snape further attests that "given those substantial compositional differences, one of

ordinary skill would not have looked to the [Susukida] patent for teachings on how to modify the MP35N alloy.”

Dr. Snape further states in the attached declaration that the Susukida patent's teaching regarding cobalt would have suggested providing an alloy with a composition very different from the MP35N alloy. Dr. Snape states that the following passage from the Susukida patent (at column 3, lines 49-61) clearly teaches that it is disadvantageous to include greater than 9.4 wt. % cobalt in the alloy of that patent:

The alloys of the invention contain cobalt in an amount from 4.7 to 9.4 percent, preferably from 6.5 to 9.4 percent. The cobalt acts to enhance the high temperature strength properties of the alloys. If contained in less than 4.7 percent, desired strength-enhancing results cannot be obtained. On the other hand, if contained in excess of 9.4 percent, the resulting alloy has room temperature strength which is too high, remarkably deteriorating the cold workability of the alloys. Thus, the cobalt content has been limited to a range from 4.7 to 9.4 percent.

Dr. Snape states that “[i]f one of ordinary skill were to have considered the above teaching of the [Susukida] patent, he would have limited cobalt content in the alloy to no more than 9.4 wt. % cobalt since, as described in the passage, exceeding that concentration presumably would substantially degrade the alloy's cold workability.” This contrasts with the MP35N alloy composition of the ASTM specification, which includes at least 29.0 wt. % cobalt. Dr. Snape states:

Given this fundamental difference between the MP35N alloy and the alloy described in the [Susukida] patent, I fail to see why one would have been motivated to modify the composition of an MP35N alloy based on teachings in the [Susukida] patent. In any case, modifying the MP35N alloy in line with the teachings in the [Susukida] patent would have resulted in an alloy including no more

than 9.4 wt. % cobalt, an alloy which is no longer within the specification for MP35N alloy as per ASTM F 562-02.

Thus, the attached Snape Declaration clearly shows that one of ordinary skill would not have been motivated to combine the teachings of the ASTM specification with the selected teachings of the Snape and Susukida patents in the manner asserted by the Examiner. Given that one of ordinary skill would not have been motivated to apply the teachings of the Snape and Susukida patents regarding the additions of magnesium, aluminum, and calcium to the alloy of the ASTM specification, the subject matter of amended claim 1 would not have been obvious, and the claim should be allowed.

3. The Present Amendments

Applicants note that the present amendments have been made for the purpose of facilitating an early agreement with the Examiner on allowable subject matter. The present amendments are not intended, and should not be considered, to foreclose the possibility that Applicants will seek claims of broader scope in a continuing application claiming priority to the Subject Application. For example, Applicants continue to maintain that the forms of independent claims 1, 21, and 51 included in Applicants' May 22, 2006 response are directed to subject matter that is both novel and unobvious relative to the prior art references of record. Applicants reserve the right to seek a patent including one or more of those previously presented claims by way of a continuing application, and the present amendments should not be considered to estop Applicants from doing so. In addition, the present amendments should not be considered to estop Applicants from seeking patent protection directed to claims in the forms Applicants previously withdrew in response to the Examiner's restriction requirement.

Conclusion:

Applicants have made a diligent effort to fully respond to the Office Action and hereby traverse all rejections presented. Applicants respectfully submit that claims 1, 2, 4-8, 10, 12-20, and 32-34 of the Subject Application, as amended herein, are in condition for allowance. Applicants respectfully request issuance of a Notice of Allowance at an early date. Applicants' present response should not in any way be taken as acquiescence to any of the specific assertions, statements, etc., presented in the Office Action not explicitly addressed herein. Applicants reserve the right to specifically address all such assertions and statements in subsequent responses

Respectfully submitted,



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